OCR
Oxford Cambridge and RSA

Higher

GCSE

Mathematics - Paper 6

J560/06: Paper 6 (Higher tier)

General Certificate of Secondary Education

Mark Scheme for November 2024

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

MARKING INSTRUCTIONS

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor.

3. Log-in to RM Assessor then mark and annotate the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader via the RM Assessor messaging system.

5. Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners should give candidates the benefit of the doubt and mark the crossed out response where legible.

6. When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

7. On each blank page the annotation **BP** must be inserted to confirm that the page has been checked. For additional objects (if present), a tick must be inserted on each page to confirm that it has been checked.

8. There is a NR (No Response) option. Award NR (No Response)
   - if there is nothing written at all in the answer space
   - OR if there is a comment which does not in any way relate to the question (e.g. 'can't do', 'don't know')
   - OR if there is a mark (e.g. a dash, a question mark) which is not an attempt at the question.

   The hash key (#) on your keyboard will enter NR.

   Note: Award 0 marks for an attempt that earns no credit (including copying out the question).

9. The RM Assessor **comments box** is used by the Principal Examiner or your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

   If you have any questions or comments for your Team Leader, use the RM Assessor messaging system.

10. Assistant Examiners should send a brief report on the performance of candidates to their Team Leader (Supervisor) by the end of the marking period. Please follow the direction of your Team Leader about which questions you should report on and how to submit your report. Your report should contain notes on particular strengths displayed as well as common errors or weaknesses.

11. Annotations available in RM Assessor. These **must** be used whenever appropriate during your marking.

Annotation	Meaning
	Correct
	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1

Annotation	Meaning
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
^	Omission sign
BP	Blank page
SEEN	Seen

For a response awarded zero (or full) marks a single appropriate annotation (cross, tick, M0 or ^) is sufficient, but not required.
For responses that are not awarded either 0 or full marks, you must make it clear how you have arrived at the mark you have awarded and all responses must have enough annotation for a reviewer to decide if the mark awarded is correct without having to mark it independently.

It is vital that you annotate standardisation scripts fully to show how the marks have been awarded.

Subject-Specific Marking Instructions

12. **M** marks are for using a correct method and are not lost for purely numerical errors.
A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
B marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
SC marks are for special cases that are worthy of some credit.

13. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

- **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point e.g. 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
- **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
- **nfww** means **not from wrong working**.
- **oe** means **or equivalent**.
- **rot** means **rounded or truncated**.
- **soi** means **seen or implied**.
- **dep** means that the marks are **dependent** on the marks indicated. You must check that the candidate has met all the criteria specified for the mark to be awarded.
- **with correct working** means that full marks **must not** be awarded without some working. The required minimum amount of working will be defined in the guidance column and **SC** marks given for unsupported answers.

14. Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

15. Unless the command word requires that working is shown and the working required is stated in the mark scheme, then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

Do not award the marks if the answer was obtained from an incorrect method, i.e. incorrect working is seen and the correct answer clearly follows from it.

16. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct. For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, e.g. FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '52 + 72'). Answers to part questions which are being followed through are indicated by e.g. FT 3 × *their* (a).

17. In questions **with no final answer line**, make no deductions for wrong work after an acceptable answer (i.e. **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

18. In questions **with a final answer line and incorrect answer given**:

(i) If the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

(ii) If the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii) If the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded if there is no other method leading to the incorrect answer. Use the **M0**, **M1**, **M2** annotations as appropriate and place the annotation × next to the wrong answer.

19. In questions **with a final answer line**:

(i) If one answer is provided on the answer line, mark the method that leads to that answer. A correct step, value or statement that is not part of the method that leads to the given answer should be awarded **M0** and/or **B0**.

(ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

(iii) If more than one answer is provided on the answer line and there is more than one method provided, award marks for the poorer response unless the candidate has clearly indicated which method is to be marked.

20. In questions with **no final answer line**:

(i) If a single response is provided, mark as usual.

(ii) If more than one response is provided, award marks for the poorer response unless the candidate has clearly indicated which response is to be marked.

21. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the **MR** annotation. **M** marks are not deducted for misreads. If a candidate corrects the misread in a later part, do not continue to follow through, but award **A** and **B** marks for the correct answer only.

22. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

23. Ranges of answers given in the mark scheme are always inclusive.

24. For methods not provided for in the mark scheme (including visual representations such as bar models, ratio tables, etc) give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

25. If in any case the mark scheme operates with considerable unfairness consult your Team Leader.

Question			Answer	Mark	Part Marks and Guidance	
1 (16)	**(a)**		9 10 12 13 14	**2**	**B1** for 3 or 4 correct	
	(b)		$\frac{5}{12}$	**2**	$\frac{5}{12}$ or **FT** *their* table **B1FT** for *their* correct numerator **B1FT** for *their* correct denominator If **0** scored, **SC1** for answer only rounding to 0.42 or 42% without $\frac{5}{12}$ seen or answer $\frac{7}{16}$	*Their* table may be complete or incomplete eg $\frac{4}{7}$ after **NR** in **(a)** scores **2** Ignore attempts to change form once correct answer seen Do not accept ratio or words
2 (17)			6.25	**3**	**M2** for $\frac{\mathbf{340-320}}{\mathbf{320}}$ [× 100] oe or $\frac{\mathbf{340}}{\mathbf{320}}$ [× 100] oe or **M1** for 340 – 320 maybe implied by 20	Implied by 0.0625, 1.0625 or 106.25

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th colspan="2">Part Marks and Guidance</th></tr>
<tr><td>3
(22)</td><td></td><td></td><td>228</td><td>4</td><td>B3 for 133, 57 and 38
or
M3 for $\frac{76}{7-3}$ × their(7 + 3 + 2) oe
or
M2 for $\frac{76}{7-3}$ × n oe where n = 2, 3 or 7
or
M1 for $\frac{76}{7-3}$ implied by 19
or correct trial with blue >76 and difference between blue and green shown</td><td>Trials
<table><tr><th>B</th><th>G</th><th>R</th><th></th><th>Dif</th><th>Tot</th></tr><tr><td>77</td><td>33</td><td>22</td><td></td><td>44</td><td>132</td></tr><tr><td>84</td><td>36</td><td>24</td><td></td><td>48</td><td>144</td></tr><tr><td>91</td><td>39</td><td>26</td><td></td><td>52</td><td>156</td></tr><tr><td>98</td><td>42</td><td>28</td><td></td><td>56</td><td>168</td></tr><tr><td>105</td><td>45</td><td>30</td><td></td><td>60</td><td>180</td></tr><tr><td>112</td><td>48</td><td>32</td><td></td><td>64</td><td>192</td></tr><tr><td>119</td><td>51</td><td>34</td><td></td><td>68</td><td>204</td></tr><tr><td>126</td><td>54</td><td>36</td><td></td><td>72</td><td>216</td></tr><tr><td>133</td><td>57</td><td>38</td><td></td><td>76</td><td>228</td></tr></table></td></tr>
<tr><td>4
(23)</td><td>(a)</td><td></td><td>3.45</td><td>4</td><td>B1 for at least three of 1.5, 2.5, 3.5, 4.5

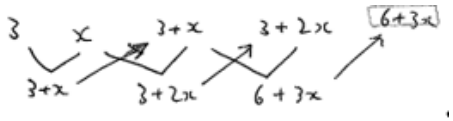
M1 FT for Σmf where m is a consistent value within each group
1.5 × 5 + 2.5 × 8 + 3.5 × 32 + 4.5 × 15 soi by 7.5 + 20 + 112 + 67.5 or 207

M1 FT dep on M1 for their 207 ÷ 60</td><td>May be implied by three correct products (7.5, 20, 112, 67.5) or [total =] 207

FT their “midpoints” seen
M1 may be implied by
Lower: 5+16+96+60 (177)
Upper: 10+24+128+75 (237)
Allow one error in calculation

FT from lower 2.95, upper 3.95</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Exact heights are not known oe</td><td>1</td><td></td><td>See appendix
Do not accept comments on the method used
Do not accept “estimate” unless clarified in comment</td></tr>
</table>

Question			Answer	Mark	Part Marks and Guidance	
5			$f = \frac{k}{e}$ oe final answer	2	**B1** for answer $\frac{k}{e}$ oe or **M1** for e [×] $f = k$ or for $\frac{1}{e} = \frac{f}{k}$	
6 (24)	(a)		$\begin{pmatrix}3\\-1\end{pmatrix}$ drawn with correct arrow	2	**B1** for $\begin{pmatrix}3\\-1\end{pmatrix}$ drawn with no or incorrect arrow or $\begin{pmatrix}3\\1\end{pmatrix}$ drawn with an arrow in either direction	Accept freehand Ignore BC on diagram Accept as part of a triangle
	(b)		$\begin{pmatrix}5\\5\end{pmatrix}$	2	**B1** each value	Penalise by 1 mark first appearance of vinculum or poor form in vector but condone second use
	(c)		$\begin{pmatrix}-3\\1\end{pmatrix}$	1		
7 (25)			Accurate ruled perpendicular bisector of AB that reaches both horizontal boundaries, with correct supporting arcs	2	**B1** for accurate ruled perpendicular bisector of AB including with no or incorrect arcs	Condone perpendicular bisector going beyond rectangle
8	(a)		99	2	**M1** for identification of 3 (or 3^2 or 9) and 11 as common factors, not spoilt	Venn diagram on its own scores **0** unless 3^2 and 11 selected
	(b)	(i)	They did not multiply by 2 oe	1		See appendix
		(ii)	99099	2	**B1** for [LCM] 990 soi by passcode or **M1** for $2 \times 3^2 \times 5 \times 11$ oe	**FT** *their* **(a)** eg **(a)** 46 **(b) 2** marks for 99099, 99046, 46046 or **B1** for **(a)** × 10

Question			Answer	Mark	Part Marks and Guidance	
9	(a)		3 + *x* 3 + *x* + 3 + 2*x* [= 6 + 3*x*]	1 1		Intent to add correct successive algebraic terms must be clearly conveyed eg  A list of the terms 3, *x*, 3 + *x*, 3 + 2*x*, 6 + 3*x* is insufficient for the second mark but scores the first mark for 3 + *x*
	(b)		13 nfww	4	**M2** for 9 + 5*x* = 74 or **M1** for 3 + 2*x* + 6 + 3*x* or better **M1 FT** for [*x* =] $\frac{74-their\ 9}{their\ 5}$	**M2** may be subsequently implied by arithmetic working **FT** must be from a*x* + b = c May be seen in stages as two arithmetic steps or as formal algebra Correct answer from trials scores **4**

10			6.25×10^{13} with correct working	**6**	**B5** an answer equivalent to 6.25×10^{13} with correct working or an answer in standard form 6.2×10^{13} to 6.3×10^{13} with correct working OR **M2** for $\frac{1}{2}$ (×) $\frac{4}{3}$ (×) π (×) 15^3 or **M1** for $\frac{4}{3}$ (×) π (×) 15^3 or 4500π or 14137 to 14139 and **M1** for $\frac{4}{3}$ (×) π (×) $(3 \times 10^{-4})^3$ soi **A1** for $3.6\pi \times 10^{-11}$ or $1.13\ldots \times 10^{-10}$ oe and **M1dep** (on M1M1) for $\frac{\textit{their}\text{ volume of bowl}}{\textit{their}\text{ volume of raindrop}}$ Alternative method: **M4** for $15^3 \div (3^3 \times 10^{-12})$ or 1.25×10^{14} oe or **M3** for $\left[\frac{4/3 \times \pi}{4/3 \times \pi}\right] \frac{15^3}{(3 \times 10^{-4})^3}$ oe and **M1dep** for 0.5 × *their* vol. scale factor	Correct working requires evidence of at least **M1M1** eg **M1** $\frac{4}{3}\pi$[×] *their* answer to $(3 \times 10^{-4})^3$ *Their* volumes must have come from use of correct formulas for hemisphere and sphere or for two spheres

Question			Answer	Mark	Part Marks and Guidance	
					If **0**, **1** or **2** scored, instead award **SC3** for answer 6.25×10^{13} with no or insufficient working If **0** or **1** scored, instead award **SC2** for a B5 answer but with no or insufficient working If **0** scored, instead award **SC1** for 2250π or 7068 to 7070 or $3.6\pi \times 10^{-11}$ or $1.13\ldots \times 10^{-10}$ with no or insufficient working	
11	**(a)**		÷2 -3	**2**	**B1** each or **SC1** wrong order	
	(b)		[m =] 0.5 nfww [p =] 6 nfww	**5**	**M1** for $5m + p = 8.5$ oe **M1** for $10m + p = 11$ oe AND **B2** for $m = 0.5$ nfww or $p = 6$ nfww or **M1** for $10m - 5m = 11 - 8.5$ or $5m = 2.5$ or $2p - p = 17 - 11$ If **0** scored, instead award **SC1** for two answers which satisfy one of the original conditions	Correct answer from trial and improvement scores **5**

Question			Answer	Mark	Part Marks and Guidance	
12	(a)		5, 6, 7	3	**B2** for 3 correct values with one extra or for 2 correct values OR **M1** for 10 + 2 < 3*x* or better **M1** for 3*x* ≤ 21 + 2 or better	For **M** marks condone use of incorrect inequality sign or equals
	(b)		-6 is smaller than -3	1		Accept: It should be -6 < *x* < -3 oe -3 < *x* contradicts *x* < -6 oe -6 and -3 should be switched oe Signs are wrong way around
13			Rotation 90° [anticlockwise] or 270° clockwise (-1, 3)	2 1 1	**B1** for triangle or vertices at (-5, 1), (-1, 1) and (-1, -2)	Must be rotate or rotation, not turn etc Condone -1, 3 Condone an answer [for full or part marks] that repeats the given transformation ie rotation, 90° [anticlockwise], (-1, 3) followed by translation $\begin{pmatrix} 8 \\ -5 \end{pmatrix}$ In other cases: If more than one transformation stated then max award is the **B1** for the triangle or vertices if drawn on the grid

Question			Answer	Mark	Part Marks and Guidance	
14	(a)		$\frac{1}{4}$ or [0].25 -6	2	**B1** for each	
	(b)		8 9	2	**B1** for each	
15			$1.8\dot{6}$ × by a power of 10 Both sides of the subtraction completed to remove recurring digits *x* correct as an unsimplified fraction after correct subtraction and stated as equal to $\mathbf{\frac{28}{15}}$	**M1** **M1** **A1**	e.g. $10x = 18.6\ldots$ or $100x = 186.6\ldots$ $90x = 168$ $x = \frac{168}{90} = \frac{28}{15}$ <u>Alternative method:</u> **M1** for $1.8\dot{6} = 1 + 0.66\ldots + 0.2$ **M1** for $= 1 + \frac{2}{3} + \frac{1}{5}$ **A1** for $= 1 + \frac{10+3}{15} = \frac{28}{15}$	Mark similarly the use of other powers of 10 and the use of *x* in subtractions

Question			Answer	Mark	Part Marks and Guidance	
16			$\sqrt{31}$ final answer	**4**	**B3** for answer 31 nfww OR **B1** for cos30 = $\frac{\sqrt{3}}{2}$ and **M2** for $x^2 = (6\sqrt{3})^2 + 7^2 - 2 \times 6\sqrt{3} \times 7\cos 30$ or better or **M1** for other correct arrangements of cosine rule where x or x^2 are not the subject	Do not accept work in decimals rounded to answers of $\sqrt{31}$ or 31 Award if seen as clear statement of fact or in use; once seen condone replacement by 0.866… or 0.87 in subsequent work Condone missing brackets Condone use of 10.39… or 10.4 and 0.866… or 0.87 in **M2** and **M1**
17	**(a)**		Fully correct diagram	**3**	**B1** 0.4 and 0.9 correctly placed **B2** 0.3 and 0.7 correctly placed or **B1** for 0.3 correctly placed or for 0.3 and 0.7 switched	
	(b)		$\frac{1}{3}$	**4**	**M3** for $\frac{\mathbf{0.6 \times 0.1}}{\mathbf{0.6 \times 0.1 + } \boldsymbol{their}\mathbf{(0.4 \times 0.3)}}$ oe or **M2** for $0.6 \times 0.1 + their(0.4 \times 0.3)$ or better implied by 0.18 or **M1** for 0.6×0.1 implied by 0.06 or for $their(0.4 \times 0.3)$ implied by 0.12	

Question			Answer	Mark	Part Marks and Guidance	
18			36	**4**	**M3** for $(1 - \frac{1}{1.25^2})$ [× 100] oe soi $\frac{9}{25}$ oe or **M2** for $\frac{1}{1.25^2}$ [× 100] oe soi $\frac{16}{25}$ oe or 64 or **M1** for 1.25 [× 100] oe or for $y = \frac{k}{x^2}$ oe	Alternative method following a valid combination of values where $x_1^2 y_1 = k$ eg $x_1 = 4$, $y_1 = 10$, $k = 160$ **M3** for $\frac{y_1 - y_2}{y_1}$ [×100] or **M2** for $\frac{their\ k}{(1.25{x_1}^2)}$ soi or **M1** for $1.25x_1$ soi eg continued $\frac{10-6.4}{10}$ [×100] $\frac{160}{5^2}$ soi by 6.4 1.25 × 4 soi by 5
19	**(a)**		-0.5 or +0.5	**2**	**M1** for $\frac{27-32}{10}$ or $\frac{32-27}{10}$ oe	For **M1** condone one error in the figures
	(b)		Tangent drawn at time 17.00 1.6 to 2.0 nfww and dep on acceptable tangent drawn	**1** **3**	**M1** for using two points on *their* line **M1** for use of $\frac{difference\ in\ y}{difference\ in\ x}$	Tangent should not cross the curve and should touch at 17.00. Condone slight daylight between tangent and curve.

20			$a = 5 \quad b = 7$ $a = -5 \quad b = 7$ with correct working	**6**	**M1** for constant term identified as $-2a^2$ or seen in *their* expansion **M1** for *their* constant term = -50 **A1** for $a = 5$ or $a = -5$ AND **M1** for $b = 32 - a^2$ or for coefficient of x^2 identified as $32 - a^2$ or seen in *their* expansion **M1** for $b = 32 - (\text{their } a)^2$ evaluated If **0**, **1** or **2** scored instead award **SC3** for both correct pairs of answers $a = 5$ and $b = 7$ $a = -5$ and $b = 7$ If **0** or **1** scored instead award **SC2** for $a = 5$ and $a = -5$ or for $a = 5$ and $b = 7$ or for $a = -5$ and b = 7 If **0** scored instead award **M1** for $(4x + a)(4x - a) = 16x^2 - a^2$ or for $(4x + a)(x^2 + 2) = 4x^3 + ax^2 + 8x + 2a$ or for $(4x - a)(x^2 + 2) = 4x^3 - ax^2 + 8x - 2a$ or **SC1** for $a = 5$ or $a = -5$ or at least one answer with $b = 7$	Correct working requires evidence of at least **M1** AND **M1** Full expansion is $16x^4 + 4ax^3 - 4ax^3 + 32x^2 - a^2x^2 + 8ax - 8ax - 2a^2$ or better scores at least **M1** AND **M1** May be seen as $32x^2$ and $-a^2x^2$ in the expansion <u>Trials:</u> **M1M1M1M1** for $(4x + 5)(4x - 5)(x^2 + 2)$ expanded and simplified to $16x^4 + 7x^2 - 50$ **A1** for $a = 5$ or $a = -5$ or **M1M1M1** for $(4x + 5)(4x - 5)(x^2 + 2)$ expanded to$16x^4 + 20x^3 - 20x^3 + 32x^2 - 25x^2 + 40x - 40x - 50$ or better **A1** for $a = 5$ or $a = -5$

21			30.9 to 31 with correct working	**5**	**M2** for $\sqrt{(24^2 + 7^2)}$ or **M1** for […]^2 = 24^2 + 7^2 and **M2** for tan^{-1} $\frac{15}{their\ 25}$ oe or **M1** for tan(BHF) = $\frac{15}{their\ 25}$ oe If **0** or **1** scored, instead award **SC2** for answer 30.9 to 31 with no or insufficient working If **0** scored, instead award **SC1** for [HF =] 25 or for [HB =] $\sqrt{850}$ oe or 29.1 to 29.2	Correct working requires evidence of at least **M1M1** <u>Alternative method:</u> **M2** for $\sqrt{(24^2 + 7^2 + 15^2)}$ or **M1** for […]^2 = 24^2 + 7^2 +15^2 and **M2** for sin^{-1} $\frac{15}{their\ \sqrt{850}}$ oe or **M1** for sin(BHF) = $\frac{15}{their\ \sqrt{850}}$ oe <u>Other methods:</u> **M2** for a correct expression that would give correct HF or HB or **M1** for "one-step away" eg sin(tan^{-1}($\frac{7}{24}$)) = $\frac{7}{\text{HF}}$ and **M2** for correct trig inverse expression with angle BHF or **M1** for correct trig expression with angle BHF May be on diagram

Question			Answer	Mark	Part Marks and Guidance	
22	a	i	$[y =] \left(\frac{1}{4}\right)^x$	1		
	b	ii	$[y =] \sqrt{4^2 - x^2}$	1		Accept $[y =] \sqrt{16 - x^2}$
	c		[*p* =] 50	1		
			[*r* =] 310	1		

APPENDIX

Exemplar responses for 4(b)

Response		Mark
Because it does not give us an exact height of a pear tree	Correct as mentions “exact height”	**1**
We don’t know the exact measurements	Accept measurements for heights	**1**
The heights are not exactly accurate	BOD	**1**
The data are not accurate	No as could refer to frequencies	**0**
We don’t know the value of H	Exact value not mentioned	**0**
We can only estimate the height, we **won’t** know the exact height	The first part suggests a comment on part (a)	**0**
Because the metres are in ranges and not precise	Comment on method	**0**
Because it’s an estimate between two heights	This is a comment on method	**0**
We have to use the middle value of height each time	This is a comment on method	**0**
Because the heights are not given	They are but not exact heights	**0**
It is not accurate	No mention of exact heights not known	**0**
Due to it being an estimate so the exact can be far off	This is a comment on part (a) and the method	**0**
Because the heights are given as $1 < h \leq 2$	This is a comment on method	**0**
Because it is an estimate and isn’t an exact number	This is a comment on the answer in (a)	**0**
Because the frequency isn’t exact, it’s an estimate of the height	Incorrect term. “Because the **height** isn’t exact” would get the mark	**0**
There is not enough data to tell the exact value of mean height	This is some comment about small samples	**0**
Because the mid-point is used	Comment on method	**0**
Because it is grouped data	Comment on method	**0**

Exemplar responses for 8(b)(i)

Response		Mark
An acceptable response will usually refer to 2		
They did not multiply by 2 / they should have multiplied by 2		**1**
They have forgotten 2	(implies omission)	**BOD 1**
They needed to multiply by 10 instead of 5	(this is not the omission)	**0**
99 x 5 x 2	(doesn't identify the omission)	**0**
990		**0**
He should multiply by 2 not by 5		**0**

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